



Oil Impregnated Paper Bushings

Trench High Voltage Products Ltd., Shenyang

72.5 kV to 1100 kV
up to 5000 A
IEC60137
GB/T4109

Group Bushing Facilities

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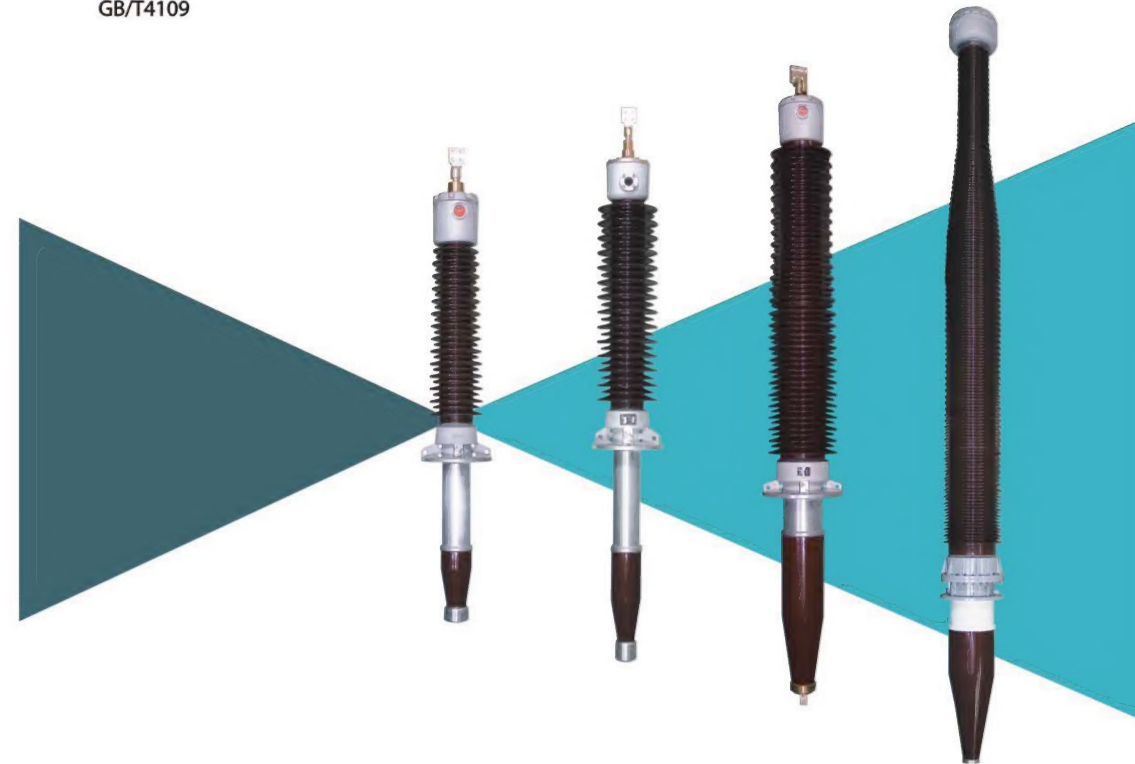
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Trench High Voltage Products Ltd., Shenyang (THVS) is a member of Trench group, a global leading manufacturer of HV transmission products. THVS uses the advanced design and processing techniques developed in Trench & Siemens and can supply 1100kV and below oil impregnated paper (OIP) and Epoxy resin impregnated paper (ERIP) bushings. Our products are designed and manufactured to IEC and ANSI where appropriate and world leaders in terms of quality and performance.

Facilities Include

- Products designed and manufactured to customer requirements.
- All bushings impulse tested as standard.
- Research and development and dielectric type testing to all national and international standards up to 3.2MV impulse, 1.5MV AC, 1.2MV DC in wet and dry conditions.
- Insulation studies and large-scale simulations.

Transformer Bushings

- Full range of designs for outdoor or indoor use.
- Oil and SF₆ connections.
- Insulation types include ERIP and OIP.
- OIP condenser bushings (type OTA) for medium/high power transformers.

Switchgear Bushings

- Epoxy resin impregnated paper condenser bushing for SF₆ insulated switchgear giving unrivaled mechanical and electrical performance up to 800kV.

Wall Bushings

- Total design and manufacture to customer requirements using epoxy resin.

Condenser Bushings for High Voltage Transformers

72.5kV to 1100kV up to 5,000A

Type OTA is a range of Oil Impregnated Paper condenser-type Transformer-to-Air bushings covering rated voltages from 72.5kV to 1100kV.

The bushings consist of a paper insulator wound onto a central tube or conductor, having aluminum foils inserted to give electrical stress grading through the insulation thickness and along its surface, producing an efficient, compact design.

The paper winding is enclosed within porcelain insulators at the outdoor and oil immersed ends and a central metallic housing which also provides the mounting flange. The wound core is impregnated with high-grade de-gassed mineral oil, following a carefully controlled heat and vacuum drying process.

Features

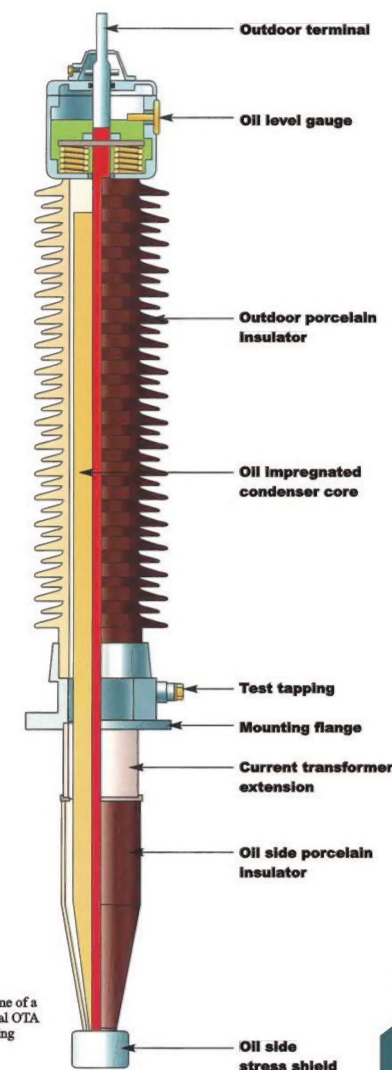
- Designed for transmission and distribution ratings in accordance with IEC 60137 and other international standards.
- Optimised construction to meet the latest Group II Classification For cantilever withstand load.
- Bushings may be installed up to 30° from vertical.
- Our proven reliability record with OIP condenser bushings guarantees extremely low partial discharge levels during transformer tests and partial discharge-free operation in service.
- Designs are provided to meet the most demanding pollution and heavy wetting conditions.
- Fixing flanges incorporate a test tapping for capacitance and tangent delta measurement.
- Transformer-end insulation is housed within a conical porcelain shell and terminated in an integral or detachable stress shield.
- Oil level indicators are provided on all bushings with magnetic indicators on bushings over 245kV.

Optional extras available on the voltage range 72.5kV to 245kV are:

- Current transformer accommodation extensions.
- Arcing horns.
- Special application outdoor porcelains.
- ANSI-type potential tapping.

Optional extras available on the voltage range 300kV to 1100kV are:

- As above, plus Air-end corona shield.



Type OTA Voltage Range 72.5kV to 245kV

Condenser bushings for
high voltage transformers

Type OTA Voltage Range 72.5kV to 245kV

Condenser bushings for
high voltage transformers

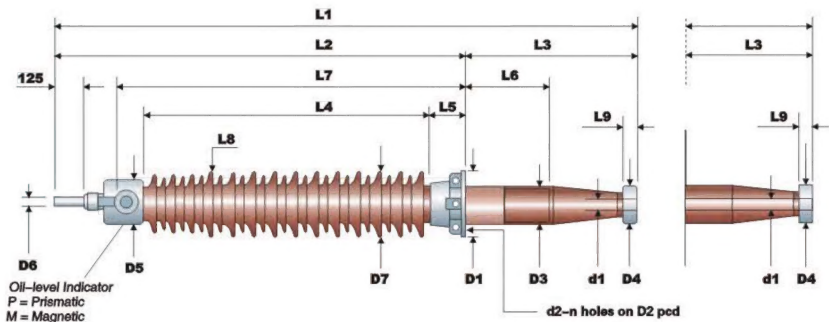


Figure 1b.

Figure 1a. Draw Lead Connection with Integral Stress Shield.

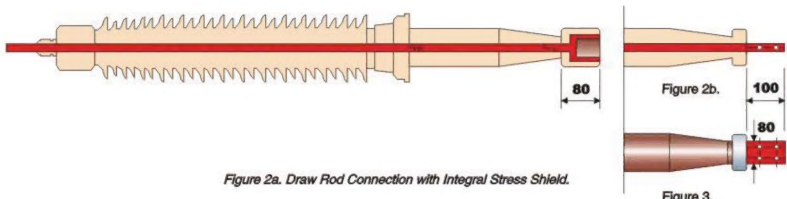
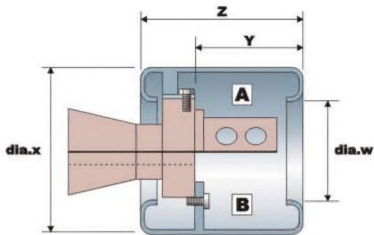


Figure 3.

Figure 2a. Draw Rod Connection with Integral Stress Shield.

Ur (kV)	Ir (A)	W	X	Y	Z	A	B
NOT REQUIRED FOR BUSHINGS WITH Fig. 1a & 2a CONNECTION ARRANGEMENTS							
72.5	1600						
123, 145	1250	120	170	150	205		B
170, 245							
72.5	100	3150	170	220	170	230	A
123, 145	3150	185	280	170	230		A
170, 245	800	120	170	55	110		B
NYLON - COATED STRESS SHIELDS							



REFERENCE		PERFORMANCE					DIMENSIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
RATED VOLTAGE (kV)		RATED CURRENT (A)		RATED PHASE TO EARTH VOLTAGE (kV)		MAX. POWER FREQUENCY WITHSTAND (kV)		LIGHTNING IMPULSE WITHSTAND (kVp)		CANTILEVER LOAD (kN)		TOTAL LENGTH		AIR-END LENGTH		OIL-END LENGTH		STRING LENGTH		FLANGE LENGTH		MINIMUM EARTH BAND		LENGTH OF DRAWLEAD CONNECTOR		GREASAGE DISTANCE (PROTECTED=0.42L)		TERMINAL LENGTH		FLANGE DIAMETER		FLANGE PITCH CIRCLE DIAMETER		MAXIMUM DIAMETER OF OIL-END		TERMINAL DIAMETER		CONSERVATOR DIAMETER		STEM DIAMETER		PORCELAIN DIAMETER		BORE OF TUBE		DIAMETER OF FLANGE BOLT HOLE		NUMBER OF BOLT HOLES		OIL-LEVEL INDICATOR		CONNECTION ARRANGEMENT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Ur	Ir	Uy	Up	Ui	F	L1	L2	L3	L4	L5	L6	L7	L8	L9	D1	D2	D3	D4	D5	D6	D7	d1	d2	n	P/M	Fig																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

Type OTA Voltage Range 300kV to 1100kV

Condenser bushings for high voltage transformers

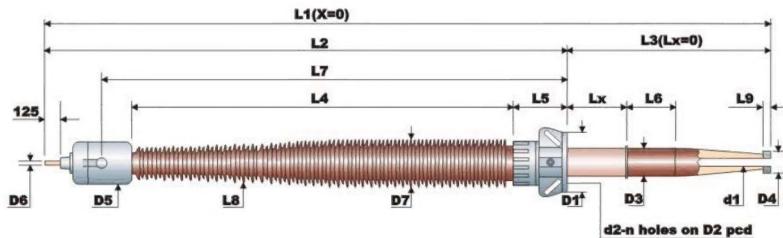


Figure 1. Draw Lead Connection

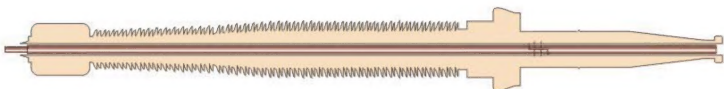


Figure 2. Draw Rod Connection

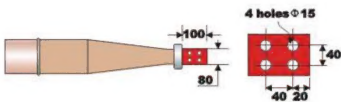
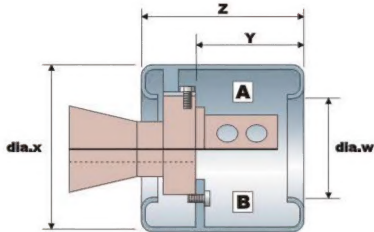


Figure 3. Direct Connection

Ur	Ir (A)	W	X	Y	Z	A	B
300	800	120	170	55	110	A	B
300	1250 & 3150	185	250	170	230	A	B
362	1600 & 3150						
362	1000	185	250	120	190	B	B
420	1000 & 1600	210	290	130	190	B	B
550							
420	1600 & 3150	210	290	230	290	A	A
550							
800		150	350	270	370	A	A

NYLON - COATED STRESS SHIELDS



A Screwed Fixing B Bolted Fixing

Type OTA Voltage Range 300kV to 1100kV

Condenser bushings for high voltage transformers

REFERENCE		PERFORMANCE						DIMENSIONS																			
RATED VOLTAGE (kV)	RATED CURRENT (A)	WET SWITCHING IMPULSE WITHSTAND (kV)	RATED PHASE TO EARTH VOLTAGE (kV)	MAX. POWER FREQUENCY WITHSTAND (kV)	LIGHTNING IMPULSE WITHSTAND (kV)	CANTILEVER LOAD (kN)		TOTAL LENGTH	AIR-END LENGTH	OIL-END LENGTH	STRING LENGTH	FLANGE LENGTH	MINIMUM EARTH BAND	HEIGHT OF DRAW LEAD CONNECTOR	CREEPAGE DISTANCE (PROTECTED-JULS)	TERMINAL LENGTH	FLANGE DIAMETER	FLANGE PITCH CIRCLE DIAM.	MAX. DIAMETER OF OIL-END	TERMINAL DIAMETER	CONSERVATOR DIAMETER	STEM DIAMETER	PORCELAIN DIAMETER	BORE OF TUBE	DIAMETER OF FLANGE BOLT HOLE	NUMBER OF BOLT HOLES	CONNECTION ARRANGEMENT
Ur	Ir	Us	Uy	Up	UI	F		L1	L2	L3	L4	L5	L6	L7	L8	L9	D1	D2	D3	D4	D5	D6	D7	d1	d2	n	Fig
362	630	950	210	625	1175	5		6650	4830	1820	3720	430	600	4525	13013	40	710	680	350	170	500	60	470	60	24	12	1
	1250							6870	4830	1820	3720	430	600	4525	13013	40	710	680	350	170	500	60	470	60	24	12	1
	2500							6510	4800	1710	3720	430	600	*	13013	50	710	680	395	*	500	60	562	*	24	12	3
	3150							6620	4800	1820	3720	430	600		13013	50	710	680	395		500	60	562		24	12	3
420	1250	1050	242	695	1425			6480	4830	1650	3720	430	430	4510	13013	40	710	680	395	170	500	60	562	70	24	12	1
	1600							6585	4765	1820	3720	430	600	*	13013	50	710	680	345	*	500	60	470	*	24	12	
	4000							7170	5280	1890	4180	430	550		14755	55	710	680	395		500	90	562		24	12	
	5000							6920	5280	1640	4180	430	550		14755	55	710	680	395		500	90	562		24	12	
550	630	1175	318	740	1675			8097	6027	2070	4925	430	550	5730	19000	40	710	680	395	170	500	60	580	70	24	12	1
	1250							7747	5457	2290	4355	430	600	5160	15243	40	810	750	395	170	500	60	562	70	24	16	1
	1600							8144	6074	2070	4925	430	550	*	17380	40	710	680	395	170	500	60	562	70	24	12	
	2500							8550	6005	2545	4925	430	940		17380	50	710	680	395	*	500	60	562	*	24	12	3
	5000							7200	5260	1940	4180	430	550		14755	55	710	680	478		500	90	650		24	12	3
800	800	1675	462	1020	2350			10548	8360	2188	7108	500	550	*	24000	50	800	711	570	210	700	60	762		32	12	
	1250							10758	8360	2090	7108	500	570		27500	50	780	711	570		700	60	762		32	12	
	1600							10815	8577	1950	7325	500	600		27500	50	800	711	570		700	60	762		32	12	
	2500							10815	8577	1950	7325	500	600		27500	50	800	711	570		700	60	762		32	12	
1100	2000	1950	636	1200	2400			13625	11070	2230	9500	500	380		33000	50	1020	950	765	265	900	80	950		36	16	
	2500							13270	10826	2562	9500	500	600		33000	50	1020	950	640	265	900	80	800		36	16	